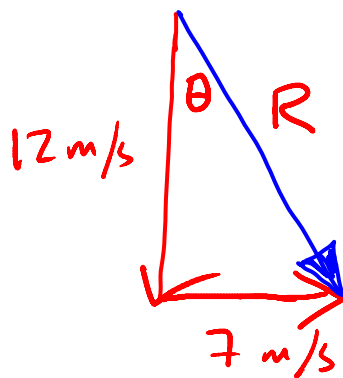
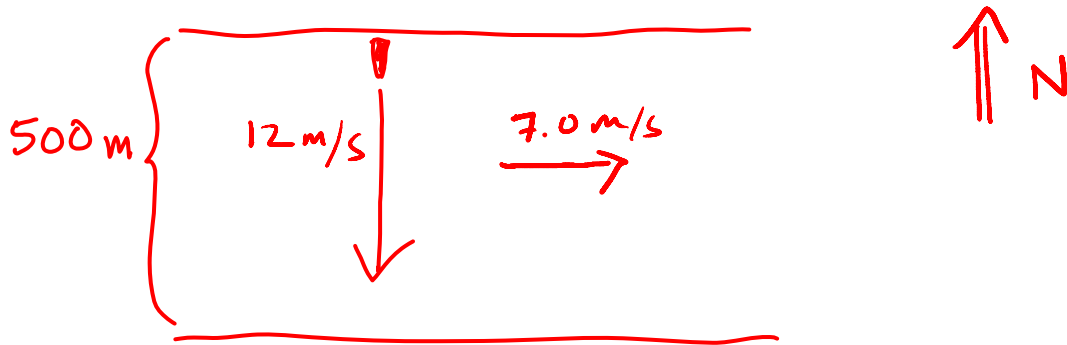


Example 6.

A boat is capable of 12 m/s in still water. If a river flows at 7.0 m/s due east and is 500 m wide:

- (a) What is the velocity of the boat relative to the shore if the boat heads south, perpendicular to the current?**



$$R = \sqrt{12^2 + 7^2}$$

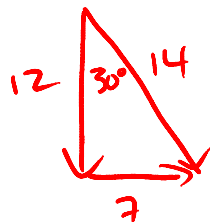
$$= 14 \text{ m/s}$$

$$\theta = \tan^{-1} \left[\frac{7}{12} \right] = 30^\circ$$

$$R = 14 \text{ m/s @ } 30^\circ \text{ E of S}$$

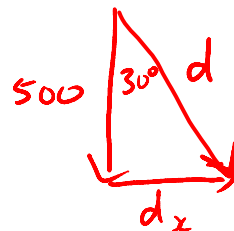
- (b) How long would it take to cross the river?**

velocity vectors



$$d = v_w t$$

displacement vectors



$$t = \frac{d}{v_w}$$

$$= \frac{500}{12}$$

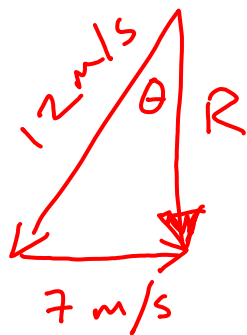
$$t = 42 \text{ s}$$

(c) Where would the boat have to aim in order to end up directly across from its starting point?

→ boat should aim into the current

12 m/s

→ vector - add boat velocity + current velocity so that the resultant is directed due south (across the river)



$$\theta = \sin^{-1} \left[\frac{7}{12} \right] = 36^\circ$$

Answer: $\boxed{36^\circ \text{ W of S}}$